



Effect of Foliar Spray with Nutrient Albaumin 221 on Growth and Yield of Cucumber Grown in Unheated Greenhouse

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Abstract: The study was conducted in greenhouses at Sadat Al-Hindiya district, Al-Mahnawiyah in the north of Babel governorate in the season 2019-2020 to study the effect of foliar spray with nutrient Abiumen 221 on the growth and yield of three varieties of cucumbers. The first factor included three varieties of cucumber, (Sahra, Omega and Rola) and, the second factor was spray with fertilizer Albaumin 221 at 0.1, 1.5 ml L⁻¹. The fertalxer was applied three times at 115 day interval. Sahra variety outperformed in plant height, number of branches, leaves, number of per plant and, length of the fruit. The variety Rola excelled in fruit and yield. The application at 1.5 ml L⁻¹ was significantly better than control in all the parameters.

Keywords: Foliar spray, Albaumin fertilizer, Cucumber

The cucumber (*Cucumis sativus* L.) is one of the crops of the important summer Cucurbitaceae family in Iraq and in many countries of the world. India and Africa are its original habitat Cucumber is cultivated in Iraq mainly in the open field in spring and autumn season, in addition to the success of cultivating inside the protected environment in tunnels and green and plastic greenhouses It is one of the stressful vegetable crops, which consumes large quantities of nutrients, especially nitrogen and potassium, and therefore requires high quantities of fertilizer with irrigation water or sprinkling to supply plants with the necessary nutrients (Practice Guide 2011). Hussein (2017) observed that spraying with PIO20 leaf nutrient at a concentration of 22 ml L⁻¹ at flowering three times at interval of 15 days caused significant increase in plant length, number of leaves, dry weight of the vegetative total, fruit length, number of fruits and yield The study aimed to determine the most appropriate concentration of foliar nutrient for vegetative growth and higher productivity of the cucumber plant and identification of best variety for response to nutrient application.

MATERIAL AND METHODS

The research was conducted in the plastic house at Sadat Al-Hindiya district, Al-Mahnawiyah area north of Babel governorate in the season 2020-2019 to study the effect of foliar spray with nutrient Albaumin 221 on the growth and yield of three varieties of cucumbers cultivated in unheated greenhouses (Table 2). After preparing the land of the green house (36 x 9 m), soil was analyzed for physical and chemical

properties of soil (Table 2). The NPK (18.18.18) was added at the rate 100 kg.h⁻¹. The experiment area was divided into 3 terraces with a suitable height of 34 m and width of 1 m for the terraces. The drip irrigation system was installed for each terrace and along it and in the middle of the terrace with a distance of (2 m) between one tube and another. The crop was sown on September 7, 2019 directly on both sides of the terraces prepared interchangeably at a distance of 40 cm between plant and plants in one terrace were 168. The experiment was in randomized complete block design in factorial layout with two factors with three replications. The first factor included three varieties of cucumber (S1-Sahra, S2- Omega and S3-Rola) and the second factor was the spray with three concentrations of nutrient fertilizer albaumin 221 (F0-0, F1-1, F2-1.5 ml L⁻¹) and the fertilizer was applied thrice 15 days after adding the diffuse substance (Al-Zahi) at a rate of 0.01% to reduce the surface tension of water particles until completely wet early in the morning, The control treatment plants were sprayed only with water. The recommended agronomic practices were adopted.

Studies traits: The plant height was measured from three plants in each experimental unit from contact with the soil to the growing point (Al-Abdullah 2008). The data was collected on number of branches, leaves and fruits per plant, the fruit length (cm), weight of fruits (g) and yield per plant were also estimated.

RESULTS AND DISCUSSION

Plant height (cm): The significant effect of the varieties on

plant height was observed, the maximum in S3 (168.78 cm) and minimum in variety (158.44 cm). This may be due to genetic differences between the varieties. The application of foliar nutrient also showed significant superiority. The height was significantly higher in F2 (165.88 cm) than control treatment (F0) (160.66 cm). This may be due to the role of nutrients reared during the process of division and elongation of cells, especially the N, which is involved in building chlorophyll, protein and nucleic acids, and then increasing photosynthesis and also contributes to the manufacture and accumulation of nutrients, which leads to improvement in better plant growth parameters. These results were consistent with earlier workers (Al-Rubaie et al 2011, Hussein and Atallah 2017, Hussein 2018, Hussein 2018). The interaction between S and F showed a significant effect on height characteristic, the combination S3 and F2 gave the highest height of 174 cm, while the combination S1 with F0 and F1 gave the lowest (158 cm).

Number of branches per plant: There were significant differences between genetic hybrids in this trait, and this indicates the presence of a large genetic variation between hybrids (Table 4). The S3 hybrids showed maximum branch per plant (5.52) and hybrid S1 gave the lowest number of branches per the plant (3.83). This may be due to the variation of the genotypes and the extent to which they are affected by the surrounding environmental conditions. The average number of branches of the plant increased with the increase in the level of leaf nutrient. F2 level gave the highest number of branches per plant (5.33) compared to the no-addition (4.42). Bilateral interaction had a significant effect between the varieties and concentrations (F, S). The combination F2 and S3 outperformed the other combinations with average of 7.00 branches per plant, while the F0, S1 the lowest branch per plant (3.63).

Number of leaves per plant: The S3 hybrid was significantly better than S1 and S2 hybrid with average of 22.36 leaves per (Table 5). This may be due to genetic variations of hybrid in increasing the growth rates through their efficiency in photosynthesis process and the increase in the accumulation of nutrients inside the plant and perhaps this helped to build a suitable root system that raised the rate of absorption of ready nutrients in the soil necessary for the construction process, which contributed to building new cells that raised the rate of these characteristics. The addition of the leaf nutrient at the F2 level achieved the significant increase of 21.88 leaves per plant, compared to the control with lowest average (19.24 leaf plant⁻¹). These results are in agreement with the findings of Al-Rubaie et al (2011) and Hussein (2018). The S3, F2 interaction showed significantly higher leaves per plant.

Table 1. Physical and chemical properties of field soils before planting

Degree of electrical conductivity EC (DS m ⁻¹)	2.24
Degree of soil reaction pH	7.63
Total nitrogen (g km ⁻¹)	0.102
Available phosphorus (mg Kg ⁻¹ soil)	16.36
Available p (g kg ⁻¹ soil)	148.00
Organic matter (g Kg ⁻¹)	9.00
Sand	184 g kg ⁻¹
Silt	712 g kg ⁻¹
Clay	104 g kg ⁻¹
Texture	Silt loam

Table 2. Components of leaf nutrient Albumin 221

Components	Values
N (%)	2.4
S (%)	3.6
Fe (%)	2.4
Mn (%)	2.4
Zn (%)	1.2
Mg (%)	0.5
Cu (%)	0.5
B (%)	0.25
Mo (%)	0.025
Co (%)	0.0002
Biological stimulant (%)	0.005

Fertilizer provided by the American company JI Botech. Inc

Table 3. Effect of variety and foliar spray on plant height (cm)

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	0	1.5	2.0	
Share	158.00	158.00	159.33	158.44
Omega	160.33	162.67	164.33	162.44
Rola	163.67	168.67	174.00	168.78
Average	160.66	163.11	165.88	
LSD (p=0.05)		F= 2.18	S= 2.18	S*F= 3.77

Table 4. Effect of variety and foliar spray on the number of branches per plant

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	3.63	3.80	4.07	3.83
Omega	5.13	5.40	4.93	5.15
Rola	4.50	5.07	7.00	5.52
Average	4.42	4.75	5.33	
LSD (p=0.05)		F= 0.47	S= 0.47	S*F= 0.82

Number of fruits per plant: The S3 cultivar showed significant difference in their average number of fruits, which was 34.00 fruit per Plant Compared to S1 and S2 with an average of 32.14-23.97 fruits per plant. The reason may be due to the increase in flower buds, which affected the increase in the number of contracted fruits, and this is due to the genetic nature as well as the hybrid response to environmental factors and their interaction with the genetic factors. This result is consistent with Al-Jabouri et al (2009) and Al-Tahafi et al (2011). There was a significant effect of leaf fertilizer on this trait, and F2 recorded the highest average fruits per plant (30.36) while control treatment (F0) gave the lowest average of 29.80 fruits per plant. The increase in the number of fruits of the plant may be attributed to spraying with nutrients, because it contains major and minor nutrients and these elements are important in improving the indicators of vegetative growth. The cultivar S3 and F2 was significantly superior to the rest of the other interventions (34.67 fruits per plant) and S1 and F1 gave the lowest of 23.87 fruits per plant.

Fruit length: There were significant differences between the hybrids in fruit length. S3 outperformed and gave the highest average of 18.52 cm, while the S1 variety gave the lowest average of 13.75 cm. The leafy nutrient spray treatments significantly differed in the length of the fruit, being maximum in F2 (17.33 cm) and control treatment gave the lowest fruit length of 16.01 cm. This may be due to the nutrients which are rich in necessary nutrients, especially nitrogen, and the number of stimulants that improve the indicators of fruit quality (Subsidy 2010). The bilateral interaction between F and S also had a significant effect and the combination F2 and S3 outperformed the rest of the combinations by giving it the highest average of 20.33 cm, while the combination F0, S1 gave the lowest average of 13.60 cm.

Fruit weight: The fruit weight varied significantly in different hybrids. S1 outperformed with highest average of 105.99 g, while the S3 variety gave the lowest mean of 102.55 g. This may be due genetic trait related to hybrids and the speed of fruit development. This is consistent with Eifediyi and Remison (2009). The results also show the significant differences by adding the leaf nutrient as the addition of the nutrient at the F2 level maximum weight of 108.77 g compared to the F0 control (99.66 g). The increase in the weight of the fruit when spraying with nutrients is due to the importance of these elements help in the biological construction of the plant and role in stimulating the process of photosynthesis and the manufacture of carbohydrates in the leaves, and then transferring and storing them in the fruits, then increasing the weight of the fruits (Zubaidi 2010). The variety S3 with F2 gave the highest of 112.00 g, while S3 with

control treatment gave the lowest of 94.33 g.

Yield per plant: There were significant differences between hybrids, S1 hybrid was recorded the maximum yield per plant (4.331 kg), while the S3 lowest average of 2.735 kg. This may be due to the difference in the genetic expression of parents and hybrid (Table 9). Average yield of one plant increased with an increase in the level of leaf albaumin 221, being

Table 5. Effect of variety and foliar spray on the number of leaves per plant

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	16.87	17.20	17.37	17.14
Omega	21.53	21.40	21.60	21.51
Rola	19.33	21.10	26.67	22.36
Average	19.24	19.90	21.88	
LSD (p=0.05)		F= 1.41	S= 1.41	S*F= 2.44

Table 6. Effect of variety and foliar spray on the number of fruits per plant

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	23.87	23.93	24.13	23.97
Omega	31.97	32.17	32.30	32.14
Rola	33.57	33.77	34.67	34.00
Average	29.80	29.95	30.36	
LSD (p=0.05)		F= 0.16	S= 0.16	S*F= 0.27

Table 7. Effect of variety and foliar spray on fruit length (cm)

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	13.60	13.77	13.90	13.75
Omega	17.13	17.33	17.77	17.41
Rola	17.30	17.93	20.33	18.52
Average	16.01	16.34	17.33	
LSD (p=0.05)		F= 0.28	S= 0.28	S*F= 0.49

Table 8. Effect of variety and foliar spray on fruit weight (g)

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	102.33	107.33	108.33	105.99
Omega	102.33	107.67	106.00	105.33
Rola	94.33	101.33	112.00	102.55
Average	99.66	105.44	108.77	
LSD (p=0.05)		F= 2.89	S= 2.89	S*F= 5.00

Table 9. Effect of variety and foliar spray on yield per plant (Kg)

Varieties	Concentration of Albaumin (ml L ⁻¹)			Average
	F0	F1	F2	
Share	4.253	4.337	4.403	4.331
Omega	3.553	3.560	3.663	3.592
Rola	2.257	2.733	3.217	2.735
Average	3.354	3.543	3.761	
LSD (p=0.05)		F= 0.24	S= 0.24	S*F= 0.41

maximum in F2 level, as it gave the highest yield of 3.761 kg as compared to the non-addition (F0) (3.354 kg). The increase is due to the role of the macronutrients in the nutrient solution used in the experiment, whose positive impact was reflected on the number and weight of the fruits and the yield of one plant (Hassan 2001), as well as the increase in the yield due to abundant vegetative growth and a strong root system to control absorption. These results were consistent with the findings of earlier workers (Morreno and Villora 2003, Muhammad 2009, Hussein and Atallah 2017). There were significant differences in the bilateral interaction between S and F, as the combination between S1 and F2 outperformed the rest of the combinations while the combination between the varieties S3 with the control treatment F0 gave the lowest yield.

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